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| 09/309,768 | 05/11/1999 | HIROFUMI SHIMOMURA | 134960/98 | 7947 |

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EXAMINER

SEDIGHIAN, REZA

| ART UNIT | PAPER NUMBER |
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2633

19

DATE MAILED: 03/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/309,768

Applicant(s)

SHIMOMURA ET AL.

Examiner

M. R. Sedighian

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,8,11-20,23-27,32 and 33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20,24,27 and 33 is/are allowed.
- 6) ☒ Claim(s) 1-4,8,11-19,23,25,26 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 13.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

1. This communication is responsive to applicant's 11/26/2003 amendments in the application of Shimomura et al. for "Optical Switch and Optical Network" filed 5/11/99. The amendments have been entered. Claims 1-4, 8, 11-20, 23-27, and 32-33 are now pending.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 8, 11, 15-16, 18, 23, 25-26, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US Patent No: 6,094,296).

Regarding claim 1, Kosaka discloses an optical switch (col. 3, lines 61-64 and 11, 14, 22, fig. 4), comprising: a first optical amplifier (17b, fig. 4) that includes a first erbium-doped fiber (21b, fig. 4) and a first optical pump source (22b, fig. 4), and a first optical branch (23b, fig. 4); a second optical amplifier (9, fig. 4) that is connected in cascade to the first amplifier (17b, fig. 4) and that includes a second erbium-doped fiber (10, fig. 4) and a second pump source (11, fig. 4) and a second optical branch (12, fig. 4); a first optical coupler (18, fig. 4) that is connected to the first amplifier (17b, fig. 4); a second optical coupler (19, fig. 4) inserted between the first (17b, fig. 4) and second amplifiers (9, fig. 4); a first control circuit (14, fig. 4) for adjusting the excitation light amounts outputted by the pump light sources of the first and second amplifiers (col. 6, lines 25-27); a third optical amplifier (17c, fig. 4) that is connected to the second amplifier (9, fig. 4) with the second optical coupler (note that amplifier unit 17c is connected to amplifier unit 9 through optical coupler 19) and that includes a third erbium-doped fiber (21c,

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fig. 4) and a third pump source (22c, fig. 4) and a third optical branch (23c, fig. 4). Kosaka differs from the claimed invention in that Kosaka does not specifically disclose switching a gain of the first and second amplifiers. However, it would have been obvious to a person of ordinary skill in the art at the time of invention that a controller such as controller 14 can increase or decrease the intensity of light generated by the light sources 11, 22b, 22c, and therefore, the gain of respective optical amplifiers can be increased or decreased, and accordingly the gain can be switched. Note that "gain switching" in the present application is defined by pumping or not pumping the light to the respective optical amplifiers 11 and 12, and such gain switching can be provided with controller 14. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention that controller 14 of Kosaka can provide gain switching functions for respective amplifiers to obtain an equal gain and equal output level for each wavelength to provide an amplification system with constant optical output level.

Regarding claims 2 and 8, Kosaka discloses semiconductor optical amplifier (col. 5, lines 50-51).

Regarding claim 3, Kosaka discloses optical fiber amplifier (col. 6, lines 9-10).

Regarding claim 11, Kosaka discloses an optical power monitor (34, fig. 10) detecting an optical power (col. 13, lines 8-15) outputted from the second amplifier (9, figs. 4, 10).

Regarding claim 15, Kosaka discloses the pumping source generates a light of 980 nm wavelength (col. 8, lines 57-66, col. 9, lines 1-4).

Regarding claim 16, Kosaka discloses forward-pumped amplifiers (22b, 22c, fig. 4).

Regarding claim 18, Kosaka discloses the pumping light generated by wavelength division multiplexing (col. 5, lines 60-67, col. 6, lines 1-5).

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Regarding claims 23, Kosaka discloses a signal light detector (34, 36, fig. 10) for detecting if the signal light is inputted to the first amplifier and a control circuit (14, fig. 10). Kosaka differs from the claimed invention in that Kosaka does not specifically disclose shutting down the first and second amplifiers. Kosaka discloses a control unit 14 for controlling the light intensity of the excitation of light sources 11, 22b, 22c based on the detected signal level (34, 36, fig. 10). Therefore, it would have been obvious to an artisan at the time of invention that a controller such as controller 14 can decrease the intensity of light generated by such light sources to such a low level so that no output signal light is generated, and thereby shutting down the amplification in order to provide a safe level output power to prevent damages. Furthermore, turning off the fiber amplifier by not exciting the light sources can turn the fiber amplifier into an optical attenuator to further prevent the transmission of light.

Regarding claim 25, Kosaka discloses a plurality of nodes (2, 4, 5, fig. 2) that are connected through an optical fiber line (3, fig. 2) and having optical line amplifiers (col. 3, lines 54-56, col. 4, lines 57-65).

Regarding claim 26, Kosaka differs from the claimed invention in that Kosaka does not specifically disclose first optical amplifier switches the route of light. Kosaka discloses a control unit 14 that control the amount of excitation of light source 11, for example if light source 11 is not pumped, the optical signals are attenuated by fiber 10 and no signal can be outputted and the transmission of light can be blocked or switched. Therefore, it would have been obvious to an artisan at the time of invention that an optical amplifier and control circuitry such as the one of Kosaka can switch the route of light signals to provide an amplification system that can respond

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to changes in input or output conditions, or operating conditions, such as link loss, pump deterioration, and gain requirements.

Regarding claim 32, Kosaka discloses the second coupler (the coupler 19) is for receiving input light to increase a power of the input signal (the input light is amplified by optical amplifier 21b and further received by coupler 19 and amplified by amplifier 9).

4. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US Patent No: 6,094,296) in view of Luo et al. (US Patent No: 6,008,932).

Regarding claims 4 and 12, Kosaka disclose the optical amplifying unit further includes a plurality of optical isolators (7, 13, fig. 4). Kosaka differs from the claimed invention in that Kosaka does not specifically disclose an optical isolator between the first and second amplifier. Luo discloses an optical amplifying section (202, fig. 2) that is comprised of a plurality of optical isolators (210, 218, 226, fig. 2), and a multi-stage EDF amplifiers (212, 224, fig. 2). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical isolators that are connected to optical amplifiers, or between amplifiers, such as the ones of Luo for the optical amplifying unit of Kosaka in order to block the backward scattering of light. Connecting optical isolators between multiple fiber amplifiers is conventionally known.

5. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US Patent No: 6,094,296) in view of Terahara (US Patent No: 6,097,535).

Regarding claims 13-14, Kosaka discloses a plurality of input filters.(20a-20c, fig. 4). Kosaka differs from the claimed invention in that Kosaka does not disclose the optical filters

inserted between the first and second amplifiers, or at the output of second amplifier. Terahara discloses optical amplifiers (32, fig. 6) and optical filters (36, 38, fig. 6) between the optical amplifier (col. 4, lines 21-32). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical filters that are connected to optical amplifiers such as the ones of Terahara for the optical amplifiers in the optical amplifying unit of Kosaka in order to cancel the wavelength dependence of gain and to reduce deviation in signal-to-noise ratio and deviation in signal power of light signal with respect to wavelength.

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US Patent No: 6,094,296) in view of Tsuda et al. (US Patent No: 6,038,063).

Regarding claim 17, Kosaka differs from the claimed invention in that Kosaka does not disclose one of the amplifiers comprises a bidirectional-pumped optical fiber amplifier. Tsuda discloses a bidirectional-pumped optical fiber amplifier (col. 5, lines 11-21 and 44, 48, 48', fig. 3). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a bidirectionally pumped optical fiber amplifier such as the one of Tsuda for one of the optical amplifiers in the optical amplifying unit of Kosaka in order to further increase output power of signal light and to improve signal to noise ratio.

7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US Patent No: 6,094,296) in view of Kinoshita (US Patent No: 6,342,965).

Regarding claim 19, Kosaka differs from the claimed invention in that Kosaka does not disclose one of the optical amplifier has a pump light that is generated by a polarization

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multiplexing. Kinoshita discloses an optical amplifier (61, fig. 6) that has a pump light (63, fig. 6) which is generated by a polarization multiplexing (col. 21, lines 47-50). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate an optical amplifier and a pump light generated by a polarization multiplexing such as the one of Kinoshita for one of the optical amplifiers in the optical amplifying unit of Kosaka in order to increase the pump power launched into the fiber and to reduce instability of gain due to polarization dependency.

8. Claims 20, 24, 27, and 33 are allowed over prior art of record.

9. Applicant's arguments with respect to claims 1, 8, and 11-12 have been considered but are moot in view of the new ground(s) of rejection.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. Sedighian whose telephone number is (703) 308-9063.

The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

M. R. Sedighian
M. R. SEDIGHIAN
Patent Examiner
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